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A mixed methods approach to identifying factors related to voluntary HIV testing among injection drug users in Shanghai, China

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SUMMARY

Objectives: Injection drug use is a major route of HIV transmission in China, yet relatively little is known about why so few injection drug users utilize free HIV testing services. This study aimed to examine barriers to HIV testing and voluntary counseling and testing (VCT) service utilization among injection drug users in Shanghai, China.

Methods: Utilizing mixed methods, we analyzed data from a survey of 540 compulsory drug abuse treatment patients and data from focus groups with 70 service providers and patients.

Results: Only 24.4% of patients expressed willingness to be tested for HIV. Willingness to be tested was associated with younger age and more positive attitudes towards condom use. Patients reported several barriers to utilization of voluntary HIV testing services, including lack of information about these services, perceptions of no risk or low-risk for HIV infection, fear of positive results, and the stigma or discrimination that may be experienced by the patient or their family. Having limited skills related to HIV counseling was reported by service providers as the primary barrier to encouraging patients to utilize HIV testing/VCT services.

Conclusions: Special intervention programs targeting injection drug users, their family members, and service providers may increase HIV testing in China.

1. Introduction

China faces the dual challenge of drug abuse and HIV/AIDS. In late 2009, approximately 1.33 million opiate addicts, mainly injection drug users (IDUs), were officially registered, but the actual number was estimated to be three times greater.[1] At the end of 2007, the number of people living with HIV had reached 700 000, and 42% of the 50 000 new HIV infections occurred among IDUs.[2] Urgent prevention and control measures are clearly needed to stop the growing epidemic of HIV/AIDS in China.

In response to the rapid spread of HIV/AIDS, the Chinese government adopted new strategies targeting both HIV/AIDS and drug abuse. One of these strategies, the HIV Voluntary Counseling and Testing (VCT) program, was established in 2003. By 2007, more than 4000 VCT clinics had been established throughout the country.[3] Research shows that if implemented appropriately, VCT is an effective intervention for reducing HIV risk behaviors and increasing HIV-related knowledge among high risk populations in China.[4] Studies conducted in the Anhui and Urumqi provinces found that participants showed significant improvement in HIV knowledge compared to baseline after receiving VCT services.[4–6] Although VCT has been shown to be effective for HIV intervention and prevention, many at-risk individuals do not seek VCT services, especially drug users. For example, Zheng et al. reported that out of the 1251 clients receiving VCT services in a general hospital in Shanghai, only 1.2% of them were IDUs. Alarmingly, the HIV seroprevalence among this population of IDUs was 53.3%.[7]

To enhance utilization of VCT services, it is critical to identify barriers that prevent at-risk individuals from using these services, as well as factors that motivate individuals to seek VCT services. Fear of a positive HIV test result is a major reason for not being tested for HIV, whereas HIV knowledge is a main motivation for seeking VCT services.[8,9] Other barriers to utilization of VCT services include the stigma and discrimination associated with HIV/AIDS and the failure to focus prevention and intervention efforts on high-risk populations such as drug users and sex workers.[10,11]

Although the few existing studies on this topic provide useful information to improve China's VCT program, they have some

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limitations. First, these studies focus on the perspective of patients, but omit the viewpoint of service providers. Service providers meet patients regularly and provide intervention and counseling during their routine work, thus positioning them to provide a valuable perspective on VCT services utilization. Second, qualitative methods are useful for gathering a wide range of information from diverse drug-using populations,[12] but few studies have used these techniques to explore barriers to VCT services utilization among drug users in China. Finally, due to the large regional variation in both the prevalence of injection drug use and the prevalence of HIV/AIDS in China, findings from studies in other regions may not be applicable to Shanghai. Overall, the number of studies on this topic is too limited to keep pace with the growing epidemic of HIV/AIDS and drug abuse in China.

To address these knowledge gaps, we used quantitative and qualitative methods to examine the barriers to voluntary utilization of HIV testing/VCT among IDUs in China, with the goal of providing evidence-based recommendations for the improvement of HIV testing services utilization. Study activities involved a diverse set of local stakeholders, including patients and service provider staff from methadone maintenance treatment (MMT) clinics, the Shanghai Anti-drug Social Worker Consortium, and the Shanghai Municipal Center for Disease Control and Prevention (CDC). To our knowledge, this is the first study conducted in China that used mixed methods to explore the barriers to HIV testing/VCT services use among IDUs from both patient and provider perspectives. Study findings can be used to facilitate the development of VCT intervention programs in the future.

2. Methods

2.1. Participants

2.1.1. Quantitative study

This study utilized baseline survey data from a 5-year longitudinal epidemiological study of IDUs in Shanghai. The main aim of the longitudinal study was to estimate gender differences in the prevalence of HIV risk behaviors and the prevalence of HIV, hepatitis C virus (HCV), and hepatitis B virus (HBV) among IDUs. The study samples were recruited from April to September 2007. Study inclusion criteria included: (1) meeting the *Diagnostic and statistical manual of mental disorders* fourth edition (DSM-IV) diagnostic criteria for substance dependence, as assessed by the structured clinical interview for DSM-IV axis I disorders (SCID-I); (2) being at least 18 years of age; and (3) being mentally capable of giving consent.

At each study site, potential participants were identified from a computerized database of heroin addicts. Individuals were approached by trained interviewers from the Shanghai Mental Health Center. After an interviewer explained the study procedures, the potential participant reviewed a consent form on her/his own and then was asked to repeat the main points of the study from her/his understanding. After consenting, each participant signed two copies of the consent form. One was kept in a secured place by the research team and the other was kept by the participant.

2.1.2. Qualitative study

A total of six focus group discussions, three with drug users (one group for males, one group for females, and one for both males and females) and three with service providers (one with MMT clinic staff, one with CDC staff and social workers, and one with nurses) were conducted in November 2010 at the Shanghai Mental Health Center.

Drug abuse treatment staff who currently work at Shanghai MMT clinics and the Shanghai Voluntary Drug Abuse Treatment Center and staff from the Shanghai Municipal CDC were invited to participate via flyers posted in their offices and mailed to their institutes. Because the individuals participating in the 5-year follow-up project were hard to reach, we invited current MMT patients to participate in the focus group discussions for this study. Based on our previous data, more than 60% of MMT clients received compulsory treatment before admission.[13] Recruitment flyers were posted in areas of the participating MMT clinics that are frequented by patients. Both the patient and service provider recruitment flyers asked interested individuals to call or e-mail research staff for more information and for verification of MMT involvement. To be eligible, service providers and health administrators had to have been working in a Shanghai health institution for at least 1 year. There were no other screening criteria for patient or service provider focus groups.

The groups included study participants, one facilitator, two observers, and other study staff. Each focus group lasted approximately 2 h and addressed several topics: (1) knowledge about HIV testing/VCT services; (2) barriers that prevent drug users from receiving HIV testing/VCT services; and (3) how to improve the acceptability of HIV testing/VCT services to drug users.

With regard to obtaining consent, all focus group participants were given an information sheet that did not require a signature. An information sheet that describes the aims of the study and emphasizes the voluntary nature of participation was considered appropriate for this research, because the research was minimal risk and did not involve any procedures for which written consent is normally required. The verbal consent process for all participants occurred prior to each focus group. The research protocols and consent process were approved by the Ethics Committee of the Shanghai Mental Health Center and the UCLA Institutional Review Board. All focus group participants received a 100 Yuan gift card for participation.

2.2. Survey measures

2.2.1. Willingness to be tested for HIV

Participants were asked whether they would be willing to be tested for HIV after release from the compulsory drug abuse treatment center. Responses were recorded as 'yes' or 'no'.

2.2.2. Demographic characteristics and HIV risk behaviors

The questionnaire collected information on demographic characteristics, such as age (in years), education level, and marital status, as well as information on HIV risk behaviors, including sharing of injection equipment, having multiple sex partners, and engaging in unsafe sexual behaviors during the 12 months prior to treatment admission.

2.2.3. HIV knowledge

HIV knowledge was measured using a 45-item set of statements developed by Carey et al.[14] This instrument includes items concerning HIV transmission, prevention, and treatment. Participants rated each statement as true, false, or unknown, and one point was given for each correct answer with a possible score ranging from 0 to 45. Higher scores indicate higher levels of HIV knowledge. The instrument was translated into Chinese by one psychiatrist and back-translated by another psychiatrist to assure accuracy of translation. Twenty patients were invited to do a pilot test of the translated instrument. Based on results from the pilot test, some items were modified to ensure that the questionnaires were culturally appropriate.

2.2.4. Perceived vulnerability to HIV infection

Perceived vulnerability was measured with the following question: Do you think you have been infected or will be infected

with HIV/AIDS? Participants were asked to select one of the following choices: not possible; low possibility; very likely; unknown.

2.2.5. Attitudes towards condom use

There were 13 statements regarding attitudes towards condom use. Each statement was rated by participants on a five-level scale according to level of agreement with the statement (1 = strongly disagree; 2 = disagree; 3 = neutral; 4 = agree; 5 = strongly agree). The possible range of scores was 13–65, with a higher score indicating a more positive attitude toward condom use. Some items, such as "Condom disturbs natural sex life", used reverse coding.

2.2.6. The Alcohol Use Disorder Identification Test (AUDIT)

AUDIT was developed by the World Health Organization to identify hazardous and harmful alcohol use, as well as dependence, and it is specifically designed for use in international settings. The AUDIT consists of 10 items to measure the quantity and frequency of alcohol use, possible dependence symptoms, and recent and lifetime problems associated with alcohol use. Responses are scored on a point system, a total score of eight or greater indicating an alcohol problem. The AUDIT was translated and validated in Chinese.[15]

2.2.7. Data analysis

Descriptive statistics were used to describe the sample characteristics and to compare HIV knowledge, perceived vulnerability to HIV infection, attitude toward condom use, and HIV/AIDS-related risk behaviors between participants willing and unwilling to test their HIV status after release from compulsory treatment centers. Chi-square tests were used for categorical variables, and two-sample *t*-tests were used for continuous variables. Logistic regression analysis evaluated the association between willingness to have HIV testing and other characteristics. Statistical significance was set at $p < 0.05$ for all tests. All statistical analyses were conducted with SPSS version 17.0.

Focus group notes were taken by two members of the research team and then entered into Microsoft Word. Qualitative data analysis involved two researchers reading the transcribed group discussions separately to develop themes and then creating a codebook that captured the textual themes using the interview guide questions as a framework. Interviews were then coded by two independent researchers to achieve an interpreter reliability of 80%. All coding disagreements were reconciled successfully.

3. Results

3.1. Quantitative study

Characteristics of the study sample are shown in Table 1. The mean age of the 540 participants was 34 years. Only 24.4% percent of participants expressed willingness to be tested for HIV after release from compulsory treatment centers. The majority (54.6%) had completed middle school and about half were never married (50.4%). The range of HIV knowledge scores was 8–37 out of a possible score of 45, with a mean of 21.3 (standard deviation (SD) 8.3). The range of attitudes toward condom use was 20–51 out of a possible range of 13–65, with a mean of 36.4 (SD 5.2). Most participants (88.0%) reported that they did not expect to be infected with HIV/AIDS. With regard to risk behaviors, 43.8% of participants had more than one sex partner and 77.9% had never used condoms during the 12 months prior to admission. Participants smoked more than one pack of cigarettes per day, and the mean AUDIT score was about 3.0, indicating a low level of alcohol use.

Results of the logistic regression analysis with the outcome of willingness to be tested for HIV are presented in Table 2.

Table 1
Characteristics of the study population by willingness to be tested for HIV

Variables	Total $N = 540$	Willing to be tested for HIV, $n = 132$ (24.4%)	Unwilling to be tested for HIV, $n = 408$ (75.6%)
Gender ($N = 540$), n (%)			
Male	266 (49.3)	69 (52.3)	197 (48.3)
Age, years, mean (SD)*	34.1 (7.8)	31.5 (7.2)	34.8 (7.9)
Education ($N = 540$), n (%)			
Less than high school	295 (54.6)	79 (59.8)	216 (52.9)
High school	220 (40.7)	48 (36.4)	172 (42.2)
College	25 (4.6)	5 (3.8)	20 (4.9)
Marital status ($N = 540$), n (%)			
Married/remarried	158 (29.3)	30 (22.7)	128 (31.4)
Widowed/separated/divorced	110 (20.4)	28 (21.2)	82 (20.1)
Never married	272 (50.4)	74 (56.1)	198 (48.5)
Reported cigarette consumption, packs/day, mean (SD)	1.8 (0.7)	1.7 (0.6)	1.8 (1.1)
AUDIT score, mean (SD)	3.1 (4.3)	3.3 (5.2)	3.0 (3.7)
HIV knowledge level, mean (SD)	21.3 (8.3)	22.3 (8.5)	21.1 (8.3)
HIV status is unknown ($N = 540$), n (%)	394 (73.0)	82 (62.1)	312 (76.5)
Attitude towards condom use, mean (SD)*	36.4 (5.2)	37.6 (6.2)	35.9 (4.8)
Perceived risk for HIV infection ($N = 540$), n (%)			
Not possible	475 (88.0)	112 (84.8)	363 (89.0)
Low possibility	33 (6.1)	10 (7.6)	23 (5.6)
Very likely	6 (1.1)	0 (0)	6 (1.5)
Unknown	26 (4.8)	10 (7.6)	16 (3.9)
Sharing injection equipment ($N = 448$), n (%)			
Yes	91 (20.3)	23 (19.8)	68 (20.5)
Unprotected sexual activities ($N = 479$), n (%)			
Never use condom	373 (77.9)	92 (73.0)	281 (79.6)
Less then 50% use condom	80 (16.7)	22 (17.5)	58 (16.4)
More than 50% use condom	26 (5.4)	12 (9.5)	14 (4.0)
Multiple sexual partners ($N = 482$), n (%)**			
More than one sexual partner	211 (43.8)	66 (52.4)	145 (40.7)

SD, standard deviation; AUDIT, the Alcohol Use Disorder Identification Test.
* $p < 0.05$.
** $p < 0.01$.

Table 2
Association (OR; 95% CI) between willingness to be tested for HIV and other characteristics

Factors	OR	95% CI
Gender (female, reference)		
Male	1.437	0.821–2.514
Age*	0.943	0.906–0.982
Education (college, reference)		
Less than high school	1.670	0.556–4.925
High School	1.304	0.435–3.914
Marital status (never married, reference)		
Married/remarried	1.026	0.554–1.902
Widowed/separated/divorced	1.472	0.724–2.994
HIV knowledge level	1.024	0.993–1.055
Attitude towards condom use*	1.073	1.025–1.123
Perceived risk for HIV infection (unknown, reference)		
Not possible	0.486	0.187–1.263
Low possibility	0.377	0.105–1.355
Very likely	0.000	0.000
Sharing injection equipment (no, reference)		
Yes	1.197	0.663–2.162
Multiple sexual partners (multiple, reference)		
One partner	0.671	0.395–1.141

* $p < 0.05$.
** $p < 0.01$.

Individuals who were younger and had more positive attitudes towards condom use were more likely to be willing to be tested for HIV in the subsequent 12 months. There also appears to be an association between higher HIV knowledge scores and willingness to be tested for HIV, but this is not statistically significant.

3.2. Qualitative study

3.2.1. Demographics

In total, 32 service provider staff and 38 MMT patients participated in focus groups. Among service provider staff, 44% were male, mean age was 37.5 (SD 8.4) years, and the average years of education was 15.7 (SD 4.3). Among MMT patients, 58% were male, the mean age was 32.7 (SD 7.6) years, and the average years of education was 8.7 (SD 5.3).

3.2.2. Main barriers to utilization of HIV testing/VCT services

Barriers to utilization of HIV testing and VCT services included: (1) lack of HIV testing/VCT information; (2) fear of positive HIV test results; (3) low perceived risk for HIV infection; and (4) stigma and discrimination related to HIV and drug use. In this section we provide more information on each barrier and we provide selected focus group quotations that illustrate each barrier.

3.2.3. Lack of information on availability of HIV testing/VCT services

Most patients mentioned there was a lack of information about HIV testing/VCT services. Most reported not knowing about the availability of HIV testing/VCT services and indicated that this knowledge gap prevented them from using these services.

"*Limited information is the barrier. I did know that HIV testing is free. MMT staff and the residents' committee never provided related information to me. Even if I want to be tested for HIV, I do not know the location of the HIV testing/VCT clinics in Shanghai or how they operate*." (Female patient)

"*The government pays more and more attention to the HIV epidemic now, and devotes more financial resources to prevent HIV, but we never heard that HIV testing is free, and we only know about mandatory HIV testing received during compulsory treatment and MMT services*." (Male patient)

MMT staff and social workers know more about free HIV testing/VCT services compared to patients; however, they seldom encourage patients to be tested for HIV during their routine work.

"*I have some information about VCT. In Shanghai, general hospitals, STD clinics, and CDC clinics in each district provide HIV testing, but during my routine work, I do not encourage them [patients] to have HIV testing unless they ask me for information on HIV testing. I always deliver other HIV-related information to them to protect them from being infected with HIV, including using condoms during sexual activities and not sharing injection equipment*." (Social worker)

"*In Shanghai, with the policy enforcing mandatory HIV and HCV testing in MMT clinics, it may, to some extent, decrease our motivation to provide HIV testing/VCT information to patients or to encourage patients to be tested for HIV during our work*." (MMT staff)

Lacking communication skills to work with HIV-positive patients prevents social workers and MMT staff from providing HIV testing/VCT information to clients.

"*I do not have the professional skills to talk with HIV-positive patients. If the test result was positive, I do not know how to tell them the results, and how to help patients calm down and deliver HIV-related counseling to them. So, if my clients don't engage in HIV high risk behaviors, I would not provide HIV testing/VCT information and encourage them to be tested for HIV*." (Social worker)

3.2.4. Fear of positive HIV test result

Most patients expressed that the fear of a positive test result was one of the most common reasons for not being tested. They would not want to face the fact.

"*If I do an HIV test and get a positive result, I do not know how to face the result, and I will think about it all day which will cause me anxiety and other emotional issues. I do not think it is good for me. For example, an individual diagnosed with cancer may live longer if he doesn't know the truth. If he was told by the doctor that he has cancer, he will be dead soon*." (Female patient)

"*From the patients' point of view, there is no cure for HIV/AIDS infection, so even if they found out their HIV status was positive, there is no effective treatment*." (Treatment staff)

3.2.5. Perception of having no/low risk for HIV infection

This problem was the most frequently discussed barrier to voluntary HIV testing. Most patients said they do not engage in HIV-related risk behaviors, so it is impossible for them to be infected with HIV. As other studies have found, participants expressed that people do not seek voluntary HIV testing unless they feel that they have risk behaviors.[16]

"*Although I am a drug user, I always think HIV is far from me. I do not think I will be infected with HIV. I never shared injection instruments with other addicts. [Facilitator: Did you share cottons, cookers and water with other addicts?] Sometimes, I shared cottons and water with others, but it was safe. We could not be infected with HIV by sharing cottons. Moreover, I never engaged in unsafe heterosexual activity; I have only one sexual partner. So, it is impossible for me to be infected with HIV. It was not necessary to be tested for HIV*." (Male patient)

"*As we all know, drug users do not have sexual impulses after long term drug use. It reduces the possibility of being infected with HIV. I have knowledge about HIV and know that HIV transmission occurs via blood and risky sexual behaviors. I do not think I am at risk for HIV infection*." (Female patient)

3.2.6. Stigma and discrimination

Stigma associated with drug use and fear of discrimination and disclosure were key issues elicited from the group discussions. Participants reported that they do not want to disclose their HIV status to anyone for fear of discrimination and social isolation.

"*Even if I know I could be infected with HIV, I would not seek HIV testing. If I go to an HIV testing/VCT center, I may meet acquaintances at the testing site and be exposed as a drug user. People will look down*

on me. In China, people think that all who visit VCT clinics are immoral. They think only those dirty people will be infected with HIV, for example, sex workers or drug users." (Female patient)

"*My client told me that some addicts want to know their HIV status, but are afraid of disclosure of their test result to the public, so they use fake names to do HIV testing in the general hospitals.*" (MMT staff)

"*If someone wants to do HIV testing voluntarily, the public will think you are a bad person. Even doctors or nurses may discriminate against you. Although the government has done lots of work to promote HIV/AIDS-related knowledge, it only focuses on the routes of HIV transmission, how to prevent HIV infection, and does not pay much attention to VCT services and how to decrease stigma toward HIV-positive patients.*" (MMT staff)

Some participants indicated that they feared being arrested and put into compulsory treatment centers, as well as discrimination not only against themselves, but also against their families.

"*Actually, some people want to be tested for HIV, because this is a better way to protect ourselves. But, we are afraid of people's peculiar looks. We also fear being arrested and put into compulsory treatment centers. Another consideration is social discrimination against my family members. I care not only about people's peculiar looks for me, but also for my family. I do not want my family being discriminated against by our neighbors.*" (Female patient)

3.2.7. Facilitators to increase HIV testing/VCT services utilization

Participants provided the following suggestions on how to improve utilization of HIV testing/VCT services: (1) make the process more convenient; (2) protect privacy; (3) start campaigns for information dissemination and public education; and (4) devote more government resources.

3.2.8. Make the testing process more convenient

Most participants suggested that if the testing process were more convenient, more patients may seek HIV testing/VCT.

"*Is it possible to make HIV testing more convenient and faster, like pregnancy testing? If yes, we can get test strips from MMT clinics or residents' communities. Also, residents' community staff may deliver tests to high-risk populations. If the result is positive, we will go to the hospital to confirm the result, but we do not want other people to get the HIV test result.*" (Female patient)

3.2.9. Protect privacy

Most participants suggested that if their personal information would not be disclosed, they would like to seek HIV testing. They also gave some advice on how to protect their privacy.

"*If treatment staff could provide HIV testing services at home that would be fine. They could deliver the test results via phone; that would make me feel good and safe. If we have to go to a VCT clinic to be tested for HIV, we really hope that the clinic uses a small doorplate and does not let other people know it is an HIV testing/VCT clinic.*" (Female patient)

"*If VCT centers were located in hidden places, more people would like to go to them.*" (Female patient)

3.2.10. Enhance education and outreach

Increasing education and outreach campaigns is another important strategy to improve utilization of HIV testing/VCT among drug users and other high-risk populations.

"*Most drug users have never heard of VCT; we do not know HIV testing and antivirus treatment are free for HIV-positive patients. MMT clinics and residents' committees should hand out brochures to patients. In China, education and dissemination on HIV and AIDS should be conducted continuously, not only on World AIDS Day. Targeted interventions are needed to promote HIV testing/VCT uptake among high-risk populations.*" (Male patient)

"*Education should be provided to the public to reduce the discrimination against drug users and HIV-positive individuals. There will be no discrimination if people treat HIV infection as normal like the common cold.*" (Male patient)

3.2.11. Increase resources devoted to HIV treatment

Despite the Chinese government's launch of the 'four free and one care' policy (including free blood tests for those with HIV, free education for orphans of AIDS patients, and free consultation, screening tests, and free antiretroviral therapy for pregnant women), HIV-positive patients still face a heavy burden. More financial and other related resources need to be made available.

"*It is good news for HIV-positive patients that the government provides the 'four free and one care' policy, but they still bear a heavy financial burden. For example, even though they do not need to pay for anti-virus treatment by themselves, they still have to pay other expenses including food, hospitalization fees, etc. Most HIV patients are poor people, and they cannot afford this heavy burden. If the government provides more welfare to HIV-positive individuals and decreases their burden, more people may seek HIV testing voluntarily.*" (CDC staff)

4. Discussion

To our knowledge, this is one of only a few studies to examine the willingness of drug users to seek HIV testing/VCT services and to explore the barriers and facilitators for receiving or delivering HIV testing/VCT services in Shanghai, China. The findings showed that only one-quarter of drug users in our study expressed willingness to be tested for HIV after release from compulsory treatment centers. This percentage is lower than percentages reported in other studies conducted in China (42.5–82.5%).[17,18] The gap between reported willingness to test for HIV and actual utilization has been described by other investigators.[19,20] We speculate that the actual utilization of HIV testing services among this population is even lower than reported. Study results indicate that younger patients and those with more positive attitudes towards condom use are more willing to be tested for HIV. These findings are consistent with results from other studies.[21,22] Based on other studies, the possible explanations for this finding are that younger patients feel more at risk because of their activities, or have more HIV-related information and knowledge compared to older patients. Furthermore, a positive attitude towards condom use also increases patient willingness to seek HIV testing.

In terms of barriers, some of the qualitative results were consistent with previous work. Both patients and service providers identified fear of positive results, stigma and discrimination, and privacy protection as the most significant barriers associated with using HIV testing/VCT services. This qualitative study also identified some additional issues that merit further attention.

Findings suggest that interventions that educate drug users on how to cope with discrimination are important for improving the acceptability of HIV testing/VCT services among drug users. Furthermore, discrimination against family members was raised as a major barrier to using services. People in China attach great importance to the concept of family. If neighbors know that someone is a drug user or is HIV-positive, that will make the family member diu mian zi (lose face). In order to protect the reputation of their family, some drug users refuse to take HIV tests even when they would like to. This finding indicates that family members may also be important targets for educational interventions to increase the utilization of HIV testing/VCT services among drug users.

A few previous studies have indicated that fear of a positive HIV test result is one of the most common reasons for not being tested.[9] To lessen this barrier, health service providers can play an important role because they meet with patients regularly and have the opportunity to provide related counseling to decrease negative emotional reactions, including anxiety and depression. Lacking

empirical data, we could not evaluate staff HIV-related counseling skills, but from the current study it seems that treatment staff and social workers do not perceive themselves as having sufficient HIV-related counseling skills, which may prevent them from providing these services during their routine work. These results underscore the importance of providing training in HIV-related counseling to service providers, especially at drug abuse treatment sites.

Another issue that warrants attention is the dissemination of HIV-related information by the municipal CDC. Our qualitative results indicated that one of the major barriers is lack of information on the availability of free HIV testing in Shanghai. Most of the participants did not know that HIV testing services and AIDS treatment are available for free. Although the Shanghai CDC provides an HIV hotline and an HIV website to the public, and sends HIV brochures on World AIDS Day (CDC staff quotations), many drug users do not know about the availability of free VCT services and have limited HIV knowledge. Therefore, current information dissemination approaches may not be adequate for reaching high-risk populations such as IDUs, as well as other at-risk individuals. According to the AIDS risk reduction model, behavior change is a complicated process.[23] The first step is to increase awareness of HIV infection among IDUs. Once IDUs realize the risk of HIV infection, they may seek related services or information voluntarily. In the current study, we found few drug users perceived themselves to be at risk of HIV infection. Furthermore, participants in the present study believed that they possessed sufficient HIV-related knowledge, but few of them were aware that HIV can be spread by sharing cottons and cookers. This will reduce their motivation to seek related information or HIV testing, because based on their knowledge and judgment, they do not see themselves as engaging in high-risk behaviors. This indicates that the existing intervention strategies should be changed. To be effective, strategies should include not only providing services, but also education to increase awareness of HIV infection, which is an important factor in encouraging patients to use public health services voluntarily.

Shanghai, as a developed city with a gross domestic product (GDP) over 1.687 trillion RMB (US$256.3 billion) in 2010, has different characteristics compared to other developing cities in China. In this study, sharing injection equipment was not common, since drug users may face low economic pressure to share equipment. However, the low level of knowledge among participants about HIV and availability of HIV testing/VCT services revealed by the present study is alarming.

This study was subject to some limitations. First, China has a policy of conducting routine HIV testing in compulsory drug treatment centers; thus theoretically all study participants were subject to HIV testing before their entry into the compulsory treatment centers, which may have reduced their motivation to use HIV services. However, the study findings indicated that 73% of participants did not know their HIV status, and unwillingness to be tested was attributed to reasons other than having been tested already. These findings indicate that there may be gaps in practice and policy that warrant further examination. Second, data were collected at locations in Shanghai. Location-specific management models or other contextual level differences may exist. Thus, results may not be generalized beyond similar drug-using populations. Third, participants may have been reluctant to discuss some sensitive issues, which may have resulted in some reporting bias.

In conclusion, this study indicates that HIV testing is not well accepted by drug users in Shanghai. The barriers contributing to low utilization include stigma and discrimination, lack of information, and privacy concerns. We also found that interventions aimed at educating family members, improving the counseling skills of service providers, and increasing other support for HIV-positive patients beyond the 'four free and one care policy' may be important in reducing barriers to HIV testing/VCT utilization. From the patient perspective, making HIV testing/VCT clinics more convenient and private would also increase utilization.

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